Catalogue no. 11F0019M — No. 328
ISSN 1205-9153
ISBN 978-1-100-16345-1

Research Paper

Analytical Studies Branch Research Paper Series

Replacing Family Income During the Retirement Years: How Are Canadians Doing?

by S. LaRochelle-Côté, J. Myles and G. Picot

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July 2010

Published by authority of the Minister responsible for Statistics Canada

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La version française de cette publication est disponible (n° 11F0019M au catalogue, n° 328).

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..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0^s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p}	preliminary
^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E}	use with caution
F	too unreliable to be published

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Abstract

This paper examines the extent to which family income during working years is "replaced" during the retirement years. It does so by tracking cohorts as they age from their mid-50s to their late 70s, using a taxation-based longitudinal data source that covers 26 years from 1982 to 2007. Earlier work by the same authors examined this question with respect to the 50% of the population with strong labour force attachment during their mid-50s. This paper extends that work to include almost all Canadians (80% to 85% of the population). The adult-equivalent-adjusted family income available to the "median" individual during his or her late 70s is about 80% of that observed when the same person was in his or her mid-50s (a replacement rate of 0.8). Replacement rates in retirement are negatively correlated with income earned around age 55. Median replacement rates are 1.1 among individuals in the bottom income quintile, 0.75 in the middle quintile, and 0.7 in the top quintile. In retirement, public pensions and other transfers more than "replace" earnings and other income of bottom quintile individuals. However, some individuals have very low replacement rates. For example, 20% of individuals in the middle income quintile had replacement rates below 0.6. More recent cohorts had higher family incomes in retirement than did earlier cohorts as a result of higher earnings and private-pension income.

Keywords: retirement, pensions, replacement rates, seniors' income

Executive Summary

The economic well-being of retiring Canadians is of interest to governments, individuals, and businesses for a host of reasons. Population ageing, along with fluctuations in the stock market and low interest rates, have fuelled concerns about potentially inadequate retirement income flows, shifts in the level and type of pension coverage, the increasing number of retirees as the baby boom ages, and the financial standing of some private-sector plans.

Concerns about whether Canadians are financially prepared for retirement are longstanding. In most western democracies, old-age income support garnered considerable attention during the 1950s to the 1970s. In Canada, this resulted in the implementation of the Canada Pension Plan in 1965.

At the time, policy analysts questioned the adequacy of the retirement system for retired Canadians. Their focus was both on low income rates, which were high by western standards in the 1960s and 1970s, and on income replacement rates, that is, the extent to which income earned during the working years would be replaced in retirement. With the maturation of private pension plans and the introduction of public pensions, low-income rates among Canadian seniors progressively declined, and are now among the lowest in the industrialized world.

Recent work by the same authors has focused on the size of the income replacement rate. LaRochelle-Côté, Myles, and Picot (2008a) asked whether family income during the working years was in fact maintained during the senior years. That work focused on individuals with "strong attachment" to the labour force, which comprise about 50% of the population aged 55. This paper extends that work to include most Canadians in the study (80% to 85% of the population), whether they have a strong labour force attachment or not.

This paper focuses on the extent to which family income during working years is "replaced" during the retirement years. It does so by tracking different cohorts as they age from their mid-50s to their late 70s, using a taxation-based longitudinal data source, the Longitudinal Administrative Database (LAD), which covers 26 years from 1982 to 2007. The focus of this study is a cohort of individuals aged 54 to 56 in 1983. Their sources of family income and their income levels are tracked until they reach 77 to 79 (in 2006). The family income is adult-equivalent-adjusted (AEA) in order to take account of economies of scale available to individuals who live in larger families. This process adjusts the income for family size, in order to allow for point-in-time (cross-sectional) comparisons and to account for longitudinal changes in family size as individuals age.

For the 1983 cohort, average before-tax family income (AEA family income) falls from about $50,000 in their mid-50s to about $42,000 in their late 60s, and remains relatively stable well into their 70s. When individuals are aged 54 to 56, three-quarters of the family income comes from earnings. By age 77 to 79, when most members of the cohort are likely retired, private pensions account for about one-third of all income, public pensions (including the Canada Pension Plan (CPP)/Quebec Pension Plan (QPP) and Old Age Security (OAS)/Guaranteed Income Supplement (GIS)) for about one-third, and investment income for 14%; earnings continue to generate about 10% of family income.

The extent to which income changes in the retirement years, and the contribution of the components to total income, depends on whether the family is at the bottom or top of the income distribution.

Unlike average income for the population as a whole, average before-tax family income *increases* with age for people in the *bottom* quintile, rising from about $19,000 in their mid-50s

to $23,000-$24,000 during their mid-60s, and remaining stable to their late 70s. This rise takes place when public pensions (CPP/QPP and OAS/GIS) replace earnings as the main source of income. When individuals are in their mid-50s, earnings constitute about two-thirds of the family income; when they are in their late 70s, public pensions account for 63%, private pensions for 14%, and earnings for about 10%.

Among individuals who are in the middle income quintile in their mid-50s, public pensions continue to play an important role, accounting for 45% of family income in their late 70s; an additional one-third of individuals' income comprises private pensions. Among those who are in the top income quintile in their mid-50s, private pensions become the major source of income 23 years later (accounting for 40% of the total), followed by investment income (20%) and public pensions (18%).

Generally speaking, more recent cohorts have improved their income positions at all ages relative to the 1983 cohort, whether before the retirement years (i.e., in their mid-50s) or in the later retirement years (at age 70 and over). This improvement was driven by both higher earnings and higher private-pension income.

In this paper, a replacement rate measures the extent to which the economic resources available to the individual through income flows (mainly earnings) around age 55 are "replaced" by various sources of income (public and private pensions, investments, as well as earnings) as the individual moves from his or her mid-50s to any given retirement age, such as 78. The AEA after-tax family income available to the "median" individual during his or her 70s was about 80% of that observed when the same person was in his or her mid-50s (a replacement rate of 0.8).

Replacement rates in retirement are negatively correlated with family income. Average replacement rates are 1.1 among individuals in the bottom income quintile, 0.75 in the middle quintile, and 0.7 in the top quintile. In retirement, public pensions and other transfers more than "replace" the income of individuals in the bottom quintile. However, some individuals have very low replacement rates. For example, 20% of individuals in the middle income quintile had replacement rates below 0.6.

1 Introduction

The economic well-being of retiring Canadians has been an important public policy item for quite some time. From the 1950s to the 1970s, discussions took place about whether Canadians were adequately prepared for retirement with policy analysts questioning the adequacy of the retirement system for retired Canadians. Their focus was both on low income rates, which were high by western standards at that time, and on income replacement rates, that is, the extent to which income earned during the working years would be replaced in retirement.[1]

In Canada, these discussions resulted in the implementation of the Canada Pension Plan in 1965. With the implementation of this program and other universal income security programs for seniors, and with the maturation of private pension plans, low-income rates among Canadian seniors progressively declined.

Recently, the issue of the economic security of retirees reappeared on the policy agenda. Population aging, of course, likely explains a good deal of the interest. More recently, however, the recent stock market decline and declining interest rates sparked renewed discussion on the issue of retirement income adequacy.

Recent work by the same authors has focused on the size of the replacement rate. LaRochelle-Côté, Myles, and Picot (2008a) asked whether family income during the working years was in fact maintained during the senior years. In this paper, a longitudinal data set was employed to estimate the extent to which family income around age 55 was "replaced" by the time the individuals in the study turned 65 to 75. It found that the family income of individuals in their mid-70s (for the median worker in the sample) was about 78% of that registered around age 55 while he or she was still working and still had a strong attachment to the labour market. Among low-income individuals, this "replacement rate" was 100%; among middle-income individuals, it was 80%; and among individuals with a high family income, this rate stood at about 70%. Furthermore, income during the retirement years increased among more recent retirees.

"Median" replacement rates are summary statistics that capture central tendencies of a population. The full distributions are required in order to describe how individuals at the low end and at the high end fare. For example, among middle-income individuals, about one-quarter had replacement rates below 60% by the time they reached their mid-70s.

In the previous study, the focus was on individuals with a "strong attachment to the labour market" while in their mid-50s. More specifically, individuals in the sample had to have had wages and salaries of at least $10,000 at age 55 in order to be included in the study. The primary concern during the 1970s was whether Canadians with significant earnings during their working years would see that income replaced as they entered their senior years.

One key question is whether similar results are obtained when all Canadians are considered, whether they are strongly attached to the labour market or not. For example, spouses who have full-time employed partners, but who themselves are not working or are working part-time, would have been excluded from the earlier study. Yet, the extent to which pre-retirement living standards are maintained in their older ages for this group is an important issue. Other individuals would also have been excluded from the earlier study, such as those working part-time and those who were not in the labour force during their mid-fifties. In all, about 50% of the

1. See Perrin (1969) and the report of the federal government Task Force on Retirement Income Policy of 1980.

population was excluded from the earlier study; only those with a strong labour force attachment were included.

This study expands the earlier one to include Canadians as a whole and measures the extent to which family income levels are maintained in senior years. As in the earlier study, the focus is not on low-income in retirement, but rather on replacement of pre-retirement income. Owing in large part to data constraints[2], individuals with very low family incomes at age 55—below $14,000 for a family of two, or below $20,000 for a family of four—remain excluded. Overall, approximately 80% to 85% of the Canadian population is included in this study, depending on the cohort examined, compared to about half the population in the earlier study (see Table 1).[3]

Table 1
Sample used in the current study compared to sample that would be obtained by using the LaRochelle-Côté, Myles and Picot (2008) threshold

	Official estimates of population aged 54 to 56[1]	Taxfilers[2]		Exclusions due to...			Study sample	
		Number	Percentage of population	Missing years[3]	Threshold	Both	Number	Percentage of population
2008 study								
1983 cohort	732,737	619,450	85	43,070	176,060	56,670	343,650	47
1986 cohort	756,267	641,420	85	35,300	191,480	43,380	371,260	49
1989 cohort	737,927	649,430	88	31,710	199,440	38,590	379,690	51
1992 cohort	757,337	697,100	92	28,970	243,860	38,780	385,490	51
1995 cohort	828,533	769,910	93	31,200	274,570	36,790	427,350	52
1998 cohort	946,759	888,310	94	31,820	319,510	35,180	501,800	53
Current study								
1983 cohort	732,737	619,450	85	0	22,120	13,790	583,540	80
1986 cohort	756,267	641,420	85	0	25,910	10,030	605,480	80
1989 cohort	737,927	649,430	88	0	30,530	10,450	608,450	82
1992 cohort	757,337	697,100	92	0	46,800	13,680	636,620	84
1995 cohort	828,533	769,910	93	0	58,900	14,510	696,500	84
1998 cohort	946,759	888,310	94	0	71,880	14,390	802,040	85

1. Official population estimates are from CANSIM table No. 051-0001.
2. Individuals must be alive and must have filed in the first three years of the panel to be included.
3. Individuals who were in the sample initially but did not file in one or more years in subsequent years.
Source: Longitudinal Administrative Database.

2 Results: Income sources among retirees

Measuring income

This paper focuses on the change in the economic welfare of individuals as they age, in particular, with how their welfare changes relative to that experienced prior to the retirement years (starting around age 55). Family income is a better indicator of welfare than is individual income. Hence, when this paper refers to the income of an individual, it refers to the income of the family to which that individual belongs. Income components such as investment income and pension income are reported in the same manner; the values represent the income of the family to which the individual belongs.

2. Back in 1983, individuals who were part of families with less than 10,000 in adult-equivalent-adjusted (AEA) income had a lower probability to file.
3. The LaRochelle-Côté, Myles and Picot study also excluded individuals who had not filed in some of the years prior to the last year of data (or prior to the year of death); those individuals are included in this study.

Incomes are reported in 2007 constant dollars. To account for differences in family size, both among families at a given point in time, and over time as the size of the family to which individuals belong changes, all incomes and income components are adult-equivalent-adjusted (AEA). The AEA family income is a *per capita* measure of family income, after taking into account economies of scale available to individuals who live in larger families. All individuals in the same family have the same AEA family income. To obtain a sense of what the family income would have been prior to adjustment (i.e, the unadjusted family income), the adjusted income should be multiplied by two for a family of four or by 1.4 for a family of two. Hence, for an individual who has an AEA family income reported here of $25,000 for example, if that individual belonged to a family of four, that family's total unadjusted income would be $50,000.[4] If the individual were part of a couple, the unadjusted family income would be $35,000.

The incomes reported here, whether total income or income components, are intended to capture a 'permanent' income concept, that is, to smooth out transitory short-run fluctuations. Since income levels and their components such as earnings and investment income can vary dramatically from year to year, income replacement rates–family income at any given age compared to that around age 55–can also vary for any given individual. To ensure that the results present a more stable "permanent" income picture, income figures are all expressed in three-year moving averages. For example, the family income of an individual in 1983 (say, for an individual aged 55), is actually his or her average family income over 1982, 1983 and 1984 inclusively. Similarly, investment or pension income in 2006, for example, is the average for these income components, at the family level, for that individual in 2005, 2006 and 2007, inclusively.

Outcomes for the 1983 cohort

Just like the approach used in the earlier study (LaRochelle-Côté, Myles and Picot, 2008), the 1983 cohort consists of all people who were aged 54 to 56 in 1983. The reason for including all people aged 54 to 56, and not just the 55 years old, is to benefit from a larger sample size—a necessary condition for the analysis of replacement rates and income level across quintiles. Therefore, any reference to individuals aged "around" 55, in fact, comprise those aged 54 to 56. Because the LAD has longitudinal properties[5], a 20% sample of tax filers aged 54 to 56 in 1983

4. To arrive at adult-equivalent-adjusted income, all family incomes or their components are divided by the square root of family size; this is perhaps the most common manner of adjusting family income. Hence, a family of four would require only twice the family income of a family of one in order to have the equivalent standard of living, not four times the income, due to economies of scale. This adult-equivalent-adjustment process does have the effect of making the family income appear somewhat lower than one might be used to seeing. For example, if a family of four has an unadjusted family income of $50,000, the adult-equivalent-adjusted income for that family would be $25,000. The adult-equivalent-adjusted income is a measure of the *per capita* economic resources available to each members of the family.
5. Statistics Canada's Longitudinal Administrative Database (LAD) consists of a random 20% sample of the T1 Family File, a yearly cross-sectional file of all tax filers. Individuals selected for the LAD are linked across years in order to create a longitudinal profile of each individual. The LAD contains demographic, income, and other taxation information for the period from 1982 to 2007; this information makes it possible to track individuals for a maximum of 25 years. As a result, it is possible to follow the evolution of the financial situation of individuals after retirement over a long period.

was followed until they were 77 to 79 years of age, in 2006.[6] Given the use of permanent income figures, these 24 years of longitudinal data represent the longest period available; hence, these results are reported first. This paper also examines whether the outcomes for more recent cohorts improve or deteriorate relative to the 1983 cohort.

Before tax family income, along with its components, provide a sense of how the shares of various income components change as individuals age from their mid-50s to their late 70s. *After tax* income, a better measure of disposable income, is used subsequently to compute replacement rates and other measures.

For the 1983 cohort, average before-tax family income (AEA family income) falls from about $50,000 around age 55 to about $42,000 in their late 60s, and remains relatively stable until around age 77, the latest observation in our data. When individuals are 54 to 56 years of age, three-quarters of the family income comes from earnings. By age 77 to 79, when most members of the cohort are likely retired, private pensions account for about one-third of all income, public pensions (including CPP/QPP and OAS/GIS) for about one-third, and investment income for 14%; earnings continue to generate about 10% of family income (Table 2).

The extent to which income changes in the retirement years and the contribution of its components, both depend on whether the family is at the bottom or the top of the income distribution. Public pensions are more important to low-income families; private pensions and investments are more important to higher-income families. To assess these differences, similar results are also examined for individuals in the bottom, middle, and top family income quintiles. The idea is to examine how incomes developed over time, given that this family had a given level of income at the beginning of the period. Hence, individuals are assigned to income quintiles on the basis of their AEA family income around age 55 (i.e., average income over 1982, 1983 and 1984). Under this approach, each person's quintile remains fixed as he or she ages.

6. This paper examines a cohort of individuals aged 54 to 56 in 1983, until they are 77 to 79 years of age in 2006. Of course, some people die or exit the sample between the beginning (1983) and end (2006) years. One commonly used approach is to restrict the sample to individuals who were in the sample at both the beginning (1983) and end (2006) years. This is not the favoured approach in this paper as it would unnecessarily reduce the sample size. Rather, for any given year, for example 1989, the sample consists of all individuals who were observed as part of the sample in both 1983 and the year of interest, in this case 1989. As we move from 1983 to 2006, the sample size is reduced as people exit. The fact that the number of people in the sample is changing as one moves from 1984 to 2007 could introduce a bias in the replacement rate trend, as the characteristics of the population could be changing. To determine whether such bias is observed, one can think of each final year as a particular cohort. For example, the sample of people who are in the data in 1983 and 1984 would be the 1984 cohort; those in the sample in 1983 and 1985 comprise the 1985 cohort; and so on. Thus, replacement rate trajectories were computed for each cohort, from 1984 to 2007, and were then superimposed one on the other. They did not differ in any significant way. Hence, allowing the sample to change as one moves from 1984 to 2007 did not introduce a significant bias in the replacement rate trajectories.

Table 2
Share of total adult-equivalent-adjusted (AEA) family income before tax across income categories, 1983 to 2006, all individuals

Year	Age	Before tax income ($)	Share of income by category						
			Earnings	Private pensions[1]	Investment	Capital gains	Old Age Security/ Guaranteed Income Supplement[2]	Canada Pension Plan and Quebec Pension Plan	Other[3]
1983	54 to 56	50,100	77.0	6.0	11.6	1.6	0.2	0.8	2.8
1984	55 to 57	50,000	75.4	7.2	11.2	2.0	0.2	1.2	2.8
1985	56 to 58	50,500	72.5	8.7	11.7	2.8	0.4	1.6	2.6
1986	57 to 59	51,100	68.7	10.6	11.9	4.1	0.4	2.2	2.3
1987	58 to 60	51,800	64.5	12.5	12.2	5.0	0.6	3.1	2.1
1988	59 to 61	53,200	59.2	14.5	13.0	6.4	0.8	4.3	2.1
1989	60 to 62	52,900	54.1	16.4	14.7	5.9	0.9	5.9	1.9
1990	61 to 63	50,700	48.9	18.5	16.4	5.3	1.4	7.5	2.2
1991	62 to 64	47,300	43.1	21.8	16.5	4.2	2.5	9.5	2.3
1992	63 to 65	45,300	36.6	24.3	15.0	4.9	4.9	11.7	2.4
1993	64 to 66	46,700	28.5	25.1	12.6	10.7	7.9	13.1	2.1
1994	65 to 67	45,800	23.4	26.0	12.7	10.5	11.4	14.6	1.5
1995	66 to 68	45,000	19.6	26.7	13.1	9.8	14.0	15.8	1.1
1996	67 to 69	42,200	18.0	28.7	14.5	4.3	16.4	17.3	0.9
1997	68 to 70	42,600	16.2	30.0	13.8	5.2	16.7	17.4	0.7
1998	69 to 71	43,100	14.8	31.6	13.7	5.3	16.7	17.2	0.7
1999	70 to 72	44,100	13.4	32.4	13.8	6.3	16.6	17.0	0.7
2000	71 to 73	44,500	12.4	33.3	14.4	6.1	16.6	16.9	0.4
2001	72 to 74	44,300	11.7	33.6	14.2	5.9	16.7	16.9	0.5
2002	73 to 75	43,200	11.6	34.5	14.1	4.6	17.4	17.4	0.5
2003	74 to 76	42,700	11.0	34.7	13.3	4.9	17.8	17.8	0.5
2004	75 to 77	43,100	10.2	34.6	13.2	6.0	17.6	17.6	0.5
2005	76 to 78	44,000	9.5	34.5	13.0	7.7	17.3	17.5	0.5
2006	77 to 79	45,000	8.7	34.0	13.6	9.3	17.1	17.1	0.4

1. Includes "other income" in the tax file (line 130) which includes severance payments and income from annuity or registered retirement income fund (RRIF) before 65 years of age, but may include some other sources as well (e.g. alimony).
2. Including social assistance and workers compensation payments.
3. Includes income from employment insurance (EI) and from goods and services tax (GST) credits only.
Source: Longitudinal Administrative Database (LAD). Numbers might not always add up due to rounding.

Unlike average income for the population as a whole, average before-tax family income *increases* with age for people in the *bottom* quintile, rising from about $19,000 around age 55 to from $23,000 to $24,000 during their mid-60s, and remaining stable to their late 70s (Table 3). This rise takes place when public pensions (CPP/QPP and OAS/GIS) replace earnings as the main source of income. When individuals are aged 54 to 56, earnings constitute about two--thirds of their family income; by age 77 to 79, public pensions account for 63%, private pensions for 14%, and earnings for about 10%. Interestingly, the reliance on earnings as a source of income in one's 70s is about the same for individuals at the bottom of the income distribution as for individuals at the top of the income distribution: earnings contribute roughly 15% of income around age 70, and decrease to about 10% around age 78. It is important to remember, however, that these are family, not individual, earnings. It may be the case that it is the individual aged 78 who is providing the earnings, or it may be some other family member. It is not known whether the earnings are generated out of necessity or because the individual chooses to continue working; nor is it known which family member provides the earnings. However, the results clearly indicate, that low-income individuals do not turn to earnings any more than do high-income individuals in their 70s. As people in lower-income families age, their average family income rises and becomes more stable (LaRochelle-Côté, Myles, and Picot 2008a) as public pensions replace the more unstable stream of earnings.

Table 3
Share of total adult-equivalent-adjusted (AEA) family income before tax across income categories, 1983 to 2006, bottom quintile

Year	Age	Before tax income ($)	Share of income by category						
			Earnings	Private pensions[1]	Investment	Capital gains	Old Age Security/ Guaranteed Income Supplement[2]	Canada Pension Plan and Quebec Pension Plan	Other[3]
1983	54 to 56	19,200	66.7	7.8	10.9	1.0	0.5	4.2	9.4
1984	55 to 57	19,300	65.8	7.8	10.4	1.6	1.0	5.2	8.3
1985	56 to 58	20,300	65.0	7.9	10.3	2.5	1.0	5.9	7.4
1986	57 to 59	21,600	63.4	7.9	10.2	3.2	1.4	6.9	6.5
1987	58 to 60	22,600	60.6	8.8	10.2	4.4	1.8	8.4	6.2
1988	59 to 61	23,700	57.0	9.3	10.5	5.5	2.1	10.1	5.9
1989	60 to 62	24,100	53.1	10.4	11.6	5.4	2.5	11.6	5.8
1990	61 to 63	23,500	48.5	11.1	12.8	4.7	3.0	13.6	6.4
1991	62 to 64	22,900	42.4	13.1	12.2	3.5	6.1	16.2	6.6
1992	63 to 65	22,900	34.9	14.4	10.0	3.5	11.8	18.3	6.1
1993	64 to 66	24,600	26.8	14.6	8.1	7.7	18.7	19.1	4.9
1994	65 to 67	25,000	22.0	14.4	7.6	7.2	25.2	20.0	4.0
1995	66 to 68	25,000	18.4	14.0	7.6	6.8	30.0	20.8	2.8
1996	67 to 69	23,800	16.4	14.3	8.4	2.1	34.5	22.3	2.5
1997	68 to 70	23,700	15.2	14.3	7.6	2.5	35.4	22.4	2.1
1998	69 to 71	23,600	14.4	14.4	7.6	2.5	36.4	22.9	2.1
1999	70 to 72	23,700	13.9	13.9	8.0	3.4	36.7	22.8	1.7
2000	71 to 73	23,700	13.1	13.9	8.4	3.0	36.7	22.8	1.7
2001	72 to 74	23,700	12.7	13.9	8.4	3.4	37.1	22.8	1.7
2002	73 to 75	23,500	11.9	14.0	8.1	3.0	37.9	23.0	1.7
2003	74 to 76	23,400	11.5	13.7	7.7	3.4	38.5	23.5	1.7
2004	75 to 77	23,200	10.8	13.8	7.3	3.4	39.2	23.7	1.7
2005	76 to 78	23,500	9.8	14.0	7.2	4.7	39.1	23.8	1.7
2006	77 to 79	23,700	8.9	13.9	7.6	5.1	39.2	23.6	1.7

1. Includes "other income" in the tax file (line 130) which includes severance payments and income from annuity or registered retirement income fund (RRIF) before 65 years of age, but may include some other sources as well (e.g. alimony).
2. Including social assistance and workers compensation payments.
3. Includes income from employment insurance (EI) and from goods and services tax (GST) credits only.
Source: Longitudinal Administrative Database (LAD). Numbers might not always add up due to rounding.

Individuals in the *middle quintile* saw average before-tax family income fall from $43,200 around age 55 to around $34,000 in their late 60s, and remain stable at that level through their late 70s (Table 4). Since income among lower-income families rises with age, and since income falls within the middle quintile, the income gap between individuals in the bottom and the middle quintile decreases as the cohort ages, from $24,000 at age 55 to $10,800 at age 70.

Among individuals in the middle quintile, earnings constitute 82% of total family income around age 55, but by age 78 public pensions (CPP/QPP plus OAS/GIS) also play an important role. They constitute 45% of before-tax family income (compared to 62% among bottom-quintile individuals); an additional one-third of individuals' income comprises private pensions. Of note, once individuals are in their late 60s and 70s, the composition of average family income changes very little. This was also the case for individuals in the bottom quintile.

Table 4
Share of total adult-equivalent-adjusted (AEA) family income before tax across income categories, 1983 to 2006, middle quintile

Year	Age	Before tax income ($)	Share of income by category						
			Earnings	Private pensions[1]	Investment	Capital gains	Old Age Security/ Guaranteed Income Supplement[2]	Canada Pension Plan and Quebec Pension Plan	Other[3]
1983	54 to 56	43,200	81.7	5.1	7.9	0.7	0.2	0.9	3.2
1984	55 to 57	43,000	80.0	6.5	7.7	0.9	0.2	1.2	3.5
1985	56 to 58	43,300	77.1	7.9	8.1	1.4	0.5	1.6	3.2
1986	57 to 59	43,500	73.6	9.9	8.5	2.1	0.5	2.5	3.0
1987	58 to 60	43,600	69.0	12.4	8.7	3.0	0.7	3.7	2.8
1988	59 to 61	43,700	63.6	14.6	9.6	3.2	0.9	5.5	2.5
1989	60 to 62	43,100	58.0	17.2	10.9	3.2	1.2	7.2	2.6
1990	61 to 63	41,500	51.8	19.8	12.0	2.9	1.7	9.4	2.7
1991	62 to 64	39,500	44.8	23.0	11.9	2.5	2.8	11.6	3.0
1992	63 to 65	37,800	37.0	25.9	10.8	3.2	5.6	14.3	3.2
1993	64 to 66	38,500	28.1	26.8	8.8	8.1	9.4	16.4	2.9
1994	65 to 67	37,500	21.6	28.0	8.8	7.7	13.6	18.4	2.1
1995	66 to 68	36,700	16.9	28.6	9.0	7.4	16.9	19.6	1.6
1996	67 to 69	34,200	14.9	30.4	9.9	2.0	19.9	21.6	1.2
1997	68 to 70	34,000	12.9	31.5	9.1	2.4	20.6	22.1	0.9
1998	69 to 71	34,100	12.0	32.6	8.8	2.6	20.8	22.3	0.9
1999	70 to 72	34,400	10.8	33.1	9.0	3.2	20.9	22.1	0.9
2000	71 to 73	34,700	10.1	33.4	9.5	3.2	21.0	21.9	0.6
2001	72 to 74	34,400	9.6	33.4	9.6	3.2	21.5	22.1	0.6
2002	73 to 75	33,800	9.2	33.7	9.2	2.4	22.2	22.5	0.6
2003	74 to 76	33,300	8.7	33.9	8.7	2.4	22.5	23.1	0.6
2004	75 to 77	33,300	8.1	33.6	8.4	3.3	22.5	23.1	0.6
2005	76 to 78	33,700	7.7	33.2	8.3	4.5	22.6	23.1	0.6
2006	77 to 79	34,500	7.0	32.2	9.0	6.4	22.0	22.6	0.6

1. Includes "other income" in the tax file (line 130) which includes severance payments and income from annuity or registered retirement income fund (RRIF) before 65 years of age, but may include some other sources as well (e.g. alimony).
2. Including social assistance and workers compensation payments.
3. Includes income from employment insurance (EI) and from goods and services tax (GST) credits only.
Source: Longitudinal Administrative Database (LAD). Numbers might not always add up due to rounding.

Individuals who were in the *top quintile* saw their average AEA family income fall as they moved from age 54 to 56 to their late 70s—from $99,200 to around $87,000 (Table 5). At any age, investment income is more important to this higher-income group. Around age 55, earnings represent 73% of family income, and investments comprise 16%. Past age 70, private pensions are the major contributor (about 40%), followed by investment income (about 20%), public pensions (CPP/QPP and OAS/GIS, about 18%), capital gains (from 7% to 14%), and earnings (from 16% to 11%). Interestingly, even individuals in the top quintile of family income rely to a significant degree on public pensions as a source of income in their 70s (for one-fifth), although private pensions clearly play a more prominent role.

Table 5
Share of total adult-equivalent-adjusted (AEA) family income before tax across income categories, 1983 to 2006, top quintile

Year	Age	Before tax income ($)	Share of income by category						
			Earnings	Private pensions[1]	Investment	Capital gains	Old Age Security/ Guaranteed Income Supplement[2]	Canada Pension Plan and Quebec Pension Plan	Other[3]
1983	54 to 56	99,200	73.3	6.6	16.0	3.0	0.1	0.2	0.8
1984	55 to 57	97,900	71.6	8.0	15.5	3.6	0.1	0.3	1.0
1985	56 to 58	97,900	68.2	9.7	15.9	4.5	0.1	0.5	1.0
1986	57 to 59	98,100	64.0	11.5	16.1	6.4	0.2	0.8	0.9
1987	58 to 60	100,400	60.0	13.4	16.3	7.9	0.3	1.3	0.7
1988	59 to 61	104,900	55.0	15.0	17.2	9.7	0.4	2.1	0.7
1989	60 to 62	104,200	51.0	16.6	19.5	8.8	0.5	3.0	0.6
1990	61 to 63	99,400	46.6	18.6	21.7	7.9	0.6	4.0	0.6
1991	62 to 64	89,800	42.3	21.9	22.7	5.9	1.1	5.5	0.7
1992	63 to 65	85,000	37.1	24.6	21.3	7.4	2.1	6.9	0.7
1993	64 to 66	87,300	30.0	25.3	18.2	14.4	3.6	8.0	0.6
1994	65 to 67	85,500	26.1	26.5	18.2	14.3	5.1	9.1	0.5
1995	66 to 68	83,600	23.2	27.9	19.0	13.3	6.5	10.0	0.4
1996	67 to 69	78,300	22.2	30.4	21.2	7.3	7.7	11.1	0.3
1997	68 to 70	80,400	20.4	32.0	20.3	8.5	7.7	10.9	0.1
1998	69 to 71	82,400	18.4	34.2	20.5	8.4	7.5	10.8	0.1
1999	70 to 72	85,400	16.3	35.7	20.3	10.0	7.3	10.4	0.1
2000	71 to 73	86,200	14.5	37.1	21.0	9.7	7.2	10.3	0.1
2001	72 to 74	85,500	14.0	38.0	20.7	9.5	7.4	10.5	0.1
2002	73 to 75	82,400	14.0	39.4	21.1	6.8	7.8	10.9	0.1
2003	74 to 76	80,900	13.7	40.0	19.9	7.2	7.9	11.1	0.1
2004	75 to 77	82,500	12.5	39.9	19.4	9.3	7.8	10.9	0.1
2005	76 to 78	85,200	11.6	39.4	19.0	11.6	7.5	10.7	0.1
2006	77 to 79	87,400	10.5	38.9	19.3	13.5	7.3	10.4	0.1

1. Includes "other income" in the tax file (line 130) which includes severance payments and income from annuity or registered retirement income fund (RRIF) before 65 years of age, but may include some other sources as well (e.g. alimony).
2. Including social assistance and workers compensation payments.
3. Includes income from employment insurance (EI) and from goods and services tax (GST) credits only.
Source: Longitudinal Administrative Database (LAD). Numbers might not always add up due to rounding.

Outcomes for more recent cohorts

Generally, more recent cohorts have improved their income positions at all ages relative to the 1983 cohort, whether before the retirement years (e.g. age 54 to 56) or in the later retirement years (age 70 and over). When capital gains are excluded from the total,[7] the 1983 cohort possessed an average family income of about $49,300, while the 1986 cohort (i.e., those who were aged 54 to 56 in 1986) saw that rise to $51,100. The 1995 and 1998 cohorts had before-tax AEA family incomes of $54,500 and $58,100, respectively, around age 55. Generally, the income advantage of younger cohorts is also evident at other ages (Chart 1). By age 65, average total family income (excluding capital gains) had risen from around $40,000 for the cohorts of the 1980s to around $50,000 for the 1995 cohort.

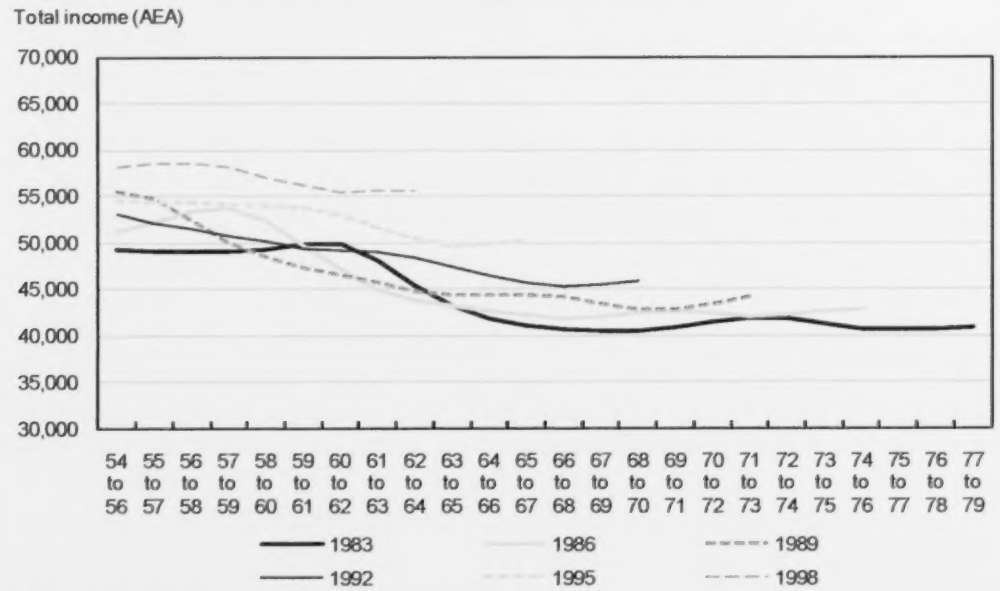
This improvement was driven by both higher earnings and higher private-pension income (Charts 2 and 3). Of the $9,100 increase in total family income seen among those aged 65 to 67 between the 1983 and 1995 cohorts two-thirds was due to higher earnings, and one-third was

7. Capital gains are typically fluctuating more than other income sources and have been subject to changes in their tax treatment over the period.

due to higher private pensions. Wage rates for more mature workers rose over the 1980s and 1990s, while they fell among the young (Beaudry and Green 2000). This would have contributed to higher earnings. It may also be that more people in the early retirement years (possibly women) were working, or those employed were working longer hours. Whether this propensity among the 1990s cohorts to generate higher earnings than did the 1980s cohorts remains to be seen.

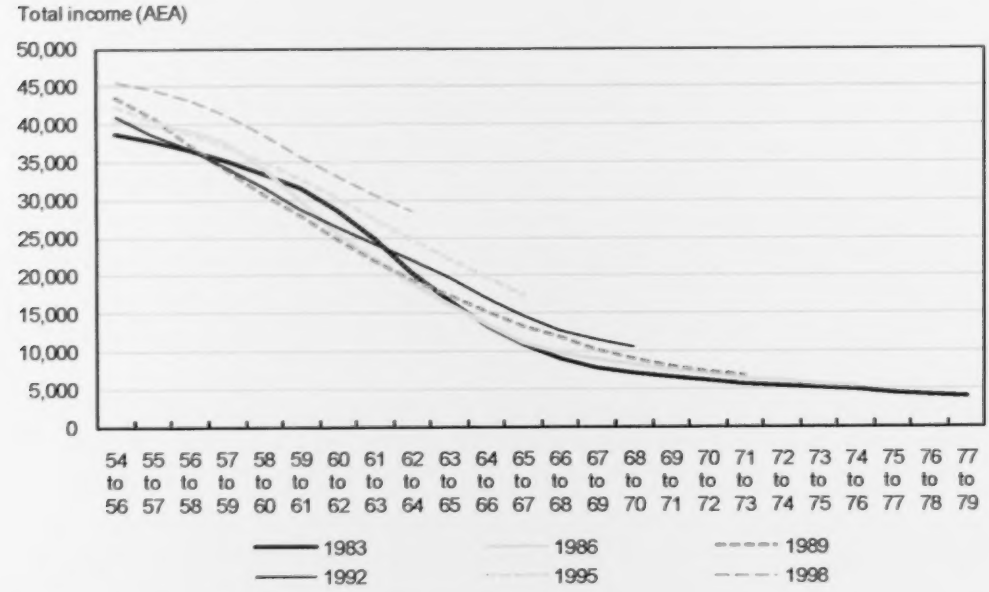
In conclusion, recent retirement cohorts have more economic resources than their predecessors on average, as a result of the higher earnings that they received while working and the higher private-pension income that they draw in the retirement years.

Chart 1
Total family income before taxes, excluding capital gains, in 2007 constant dollars, adult-equivalent-adjusted (AEA)



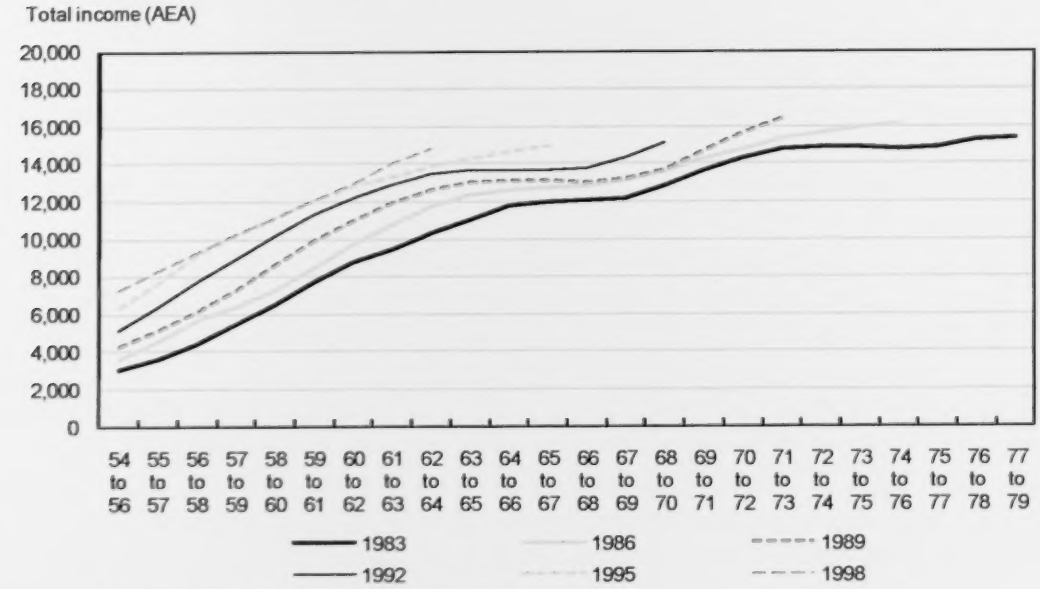
Source: Longitudinal Administrative Database, 1982 to 2007.

Chart 2
Family income from earnings, in 2007 constant dollars, adult-equivalent-adjusted (AEA)



Source: Longitudinal Administrative Database, 1982 to 2007.

Chart 3
Family income from private pensions, (including annuities, severance payments and registered retirement savings plan) in 2007 constant dollars, adult-equivalent-adjusted (AEA)



Source: Longitudinal Administrative Database, 1982 to 2007.

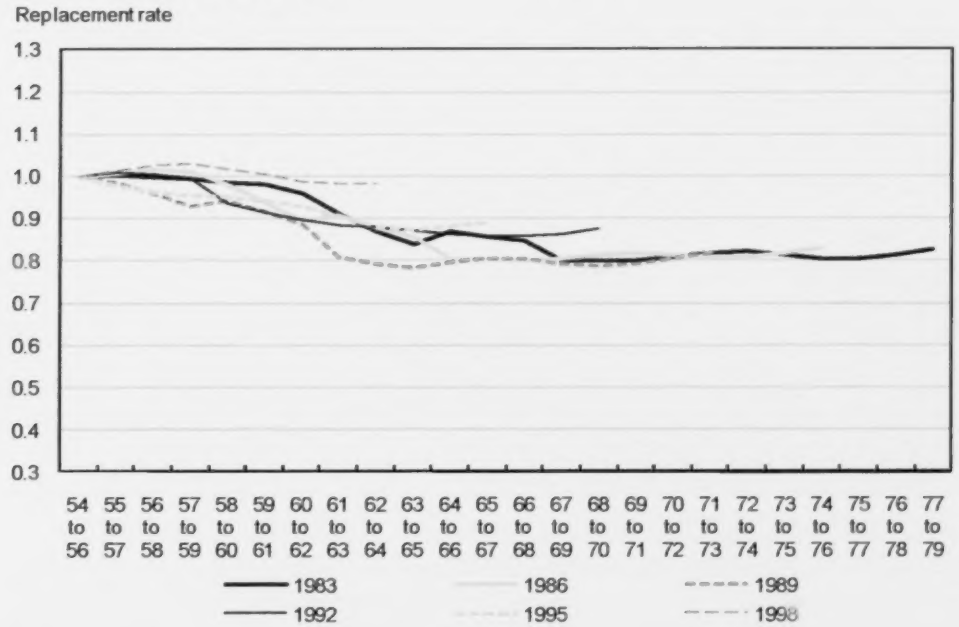
3 Results: Replacement rates

A replacement rate measures the extent to which the economic resources available to the individual through income flows (mainly earnings) are "replaced" by various sources of income (public and private pensions, investments, as well as earnings) as the individual moves from age 55 to any given retirement age, such as 78.[8] In this paper, replacement rates are obtained by dividing the individual's AEA family income at any given age, 78 for example, by that of the same individual at age 55. Note that, if the size of the family to which the individual belongs changes for any reason, such as divorce, marriage, widowhood, etc., the family income of that individual is adjusted in order to account for the change in family size. Since after-tax income is the best measure of "disposable" income available, it is the most appropriate concept to use in the calculation of replacement rates.

Median replacement rates across all individuals

The AEA family income available during the retirement years to the "median" individual is about 80% of that observed when that same person was in his or her mid-50s (Chart 4).

Chart 4
Median replacement rates of adult-equivalent-adjusted family income after taxes, all individuals



Source: Longitudinal Administrative Database, 1982 to 2007.

Median replacement rates for the cohort of Canadians who were aged 54 to 56 in 1983 fell from 1.0 (by definition) to 0.8 around age 68, and remained stable at this level through to their late 70s. More recent cohorts display the same general pattern: a slow decline from the mid-60s to

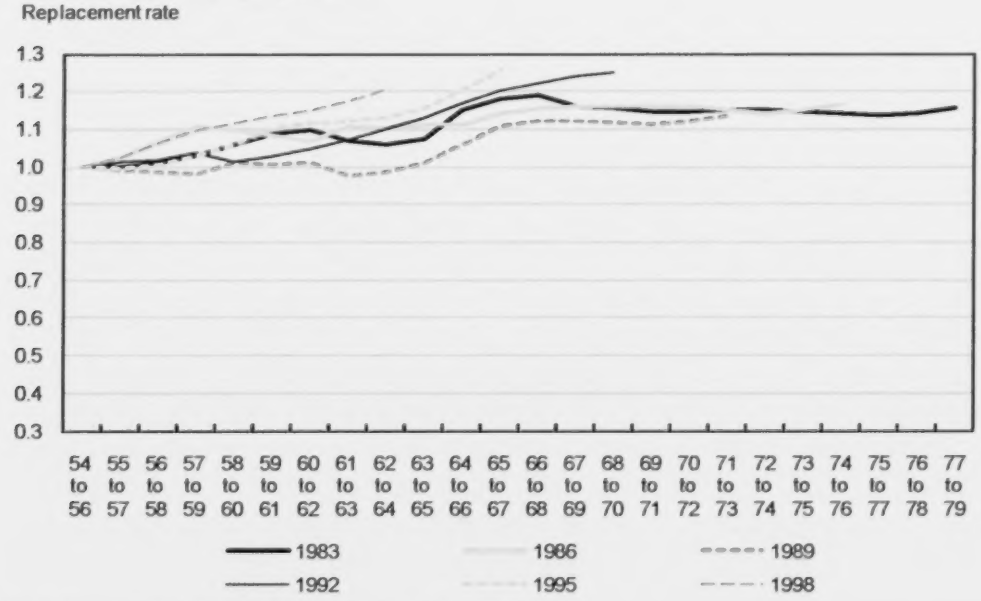
8. As noted earlier, this paper uses a form of "permanent" income whereby the family income reported at each age is a three-year moving average. For example, family income for an individual aged 55 in 1983 is really the average adult-equivalent-adjusted (AEA) family income of that individual in 1982, 1983 and 1984.

the late 60s, then stability at around 0.8. Data for more recent cohorts who turned age 55 during the 1990s suggest that their replacement rates may be somewhat higher than those of the 1980s cohorts. However, the data for these groups extend only into their mid-60s, and it is difficult to say whether this pattern will hold as they move into their 70s. As noted earlier, rising family incomes among these groups were related to higher earnings when they were in their 50s and 60s as well as to the associated higher private-pension incomes.

Results across the income distribution

Replacement rates vary depending upon where an individual is located in the income distribution. In general, the higher the income at age 55, the lower the replacement rate during the retirement years (LaRochelle-Côté, Myles, and Picot 2008a). On average, as noted earlier, individuals in the bottom quintile (around age 55) find that the public-pension system more than replaces the earnings and other income they had in their mid 50s; this results in replacement rates that rise above 1.0 (Chart 5). Among the 80s cohorts, for example, replacement rates rose to slightly over 1.1 when cohort members reached their mid-60s, and remained at around 1.1 to age 77 to 79, the latest observation. Data on the cohorts' income during their 60s suggest that replacement rates for the cohorts of the 1990s may be marginally higher than those of the 1980s cohorts.

Chart 5
Median replacement rates of adult-equivalent-adjusted family income after taxes, bottom quintile



Source: Longitudinal Administrative Database, 1982 to 2007.

However, these results refer to *median* replacement rates among lower-income individuals. Table 6 shows that, while they were in their late 60s, when replacement rates had stabilized, approximately 9% of the members of this bottom quintile had replacement rates below 0.8. Since eligibility for OAS and GIS is almost universal for lower-income individuals, these shares are relatively small. However, some people may not receive these incomes, even though they are eligible for them (Luong 2009), and some may not receive CPP/QPP.

Table 6
Distribution of individuals across replacement rate categories among individuals aged 54 to 56 in 1983

	Distribution across age groups				
	54 to 56	59 to 61	64 to 66	69 to 71	74 to 76
	percent				
All individuals					
Smaller or equal to 0.4	0.0	3.1	3.1	2.4	2.8
Larger than 0.4 and smaller or equal to 0.6	0.0	7.9	13.5	16.6	16.6
Larger than 0.6 and smaller or equal to 0.8	0.0	17.0	25.2	31.2	29.8
Larger than 0.8 and smaller or equal to 1.0	100.0	24.7	20.9	22.0	22.3
Larger than 1.0 and smaller or equal to 1.5	0.0	36.6	25.4	20.4	20.7
Larger than 1.5	0.0	10.7	11.9	7.4	7.8
Bottom quintile					
Smaller or equal to 0.4	0.0	5.2	1.9	0.2	0.2
Larger than 0.4 and smaller or equal to 0.6	0.0	6.4	3.6	0.5	0.9
Larger than 0.6 and smaller or equal to 0.8	0.0	11.8	10.9	8.3	8.0
Larger than 0.8 and smaller or equal to 1.0	100.0	17.8	18.9	24.0	24.4
Larger than 1.0 and smaller or equal to 1.5	0.0	37.2	37.9	43.9	43.4
Larger than 1.5	0.0	21.5	26.7	23.0	23.2
Middle quintile					
Smaller or equal to 0.4	0.0	2.1	2.0	0.7	0.9
Larger than 0.4 and smaller or equal to 0.6	0.0	7.6	14.2	19.9	21.0
Larger than 0.6 and smaller or equal to 0.8	0.0	17.5	30.5	37.8	35.5
Larger than 0.8 and smaller or equal to 1.0	100.0	27.3	22.8	23.1	23.1
Larger than 1.0 and smaller or equal to 1.5	0.0	38.7	23.0	15.2	16.0
Larger than 1.5	0.0	6.9	7.5	3.1	3.5
Top quintile					
Smaller or equal to 0.4	0.0	3.4	6.4	7.7	8.4
Larger than 0.4 and smaller or equal to 0.6	0.0	10.8	21.0	28.1	25.9
Larger than 0.6 and smaller or equal to 0.8	0.0	20.3	27.2	34.1	31.1
Larger than 0.8 and smaller or equal to 1.0	100.0	25.3	17.8	15.6	17.7
Larger than 1.0 and smaller or equal to 1.5	0.0	31.2	19.3	10.6	12.2
Larger than 1.5	0.0	9.0	8.3	4.0	4.7

Source: Longitudinal Administrative Database.

On the other hand, some individuals who were in the bottom income quintile in their mid-50s moved up the income distribution, sometimes producing replacement rates well above 1.0. Two-thirds of bottom-quintile individuals had replacement rates above 1.0 during their late 60s and mid-70s, and as many as 23% of these had replacement rates above 1.5.

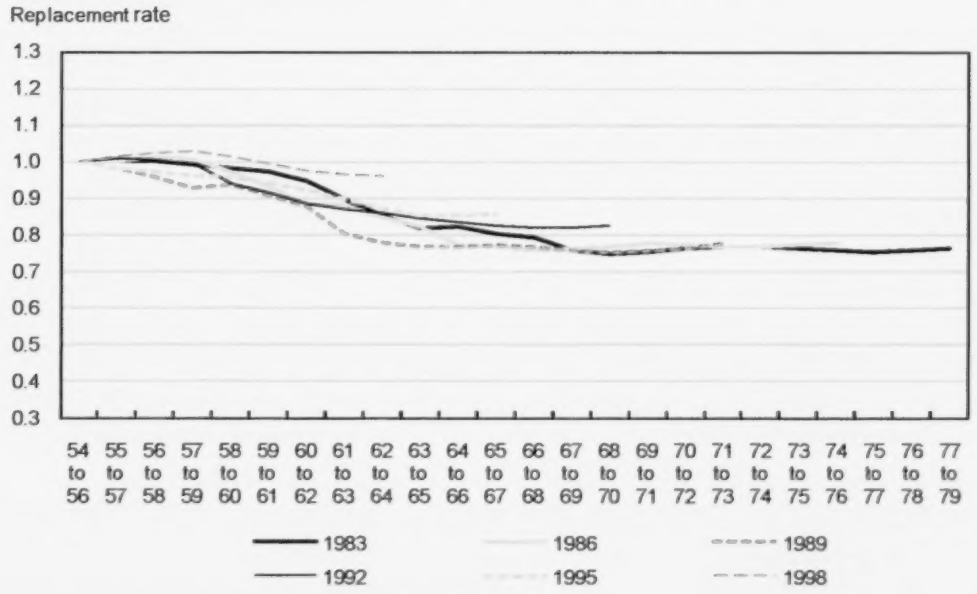
Members of the *middle income* quintile (around age 55) saw their replacement rates fall to about 0.75 during their late 60s, and again remain stable through to age 77 (Chart 6). As in other cases, there is preliminary evidence to suggest that the rates for the cohorts of the 1990s may be marginally higher than those of the 1980s cohorts.

The *distribution* of the rates for middle-income individuals indicates that 22% had replacement rates below 0.6 during their late 60s and mid-70s.

Finally, people in the *top income* quintile displayed the lowest replacement rates (in comparison to the other quintiles) while they were in their early 70s (Chart 7). Median rates for this group with respect to the 1980s cohorts fell to around 0.65 when they were in their mid- to late 60s, recovering to about 0.7 during their late 70s. Furthermore, some 34% among this group experienced replacement rates below 0.6 in their mid-70s. However, it is also interesting to note

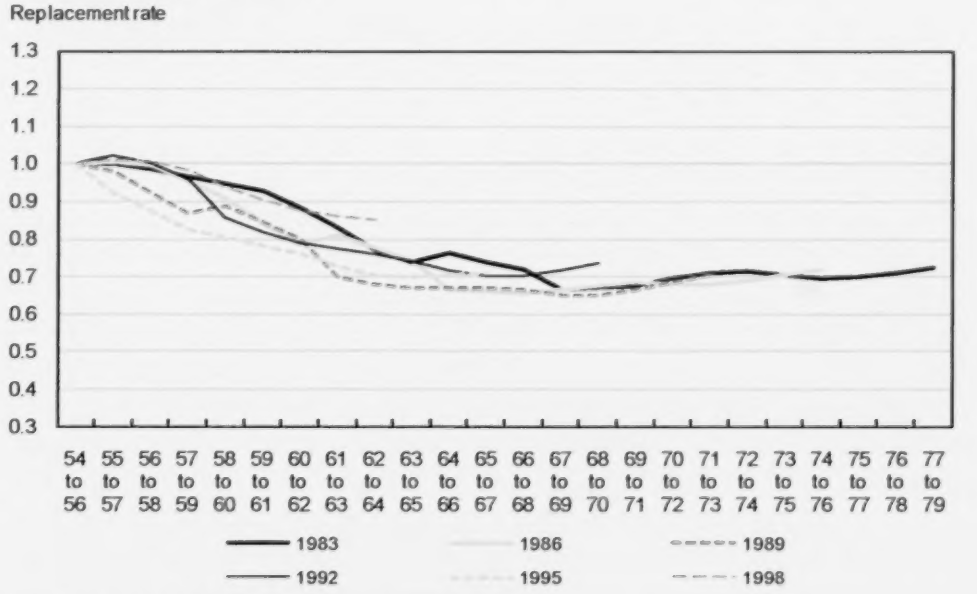
that nearly one in five (17%) of top quintile individuals had replacement rates above 1.0—indicating that a significant portion of top-quintile individuals benefited from even higher income levels as they aged.

Chart 6
Median replacement rates of adult-equivalent-adjusted family income after taxes, middle quintile



Source: Longitudinal Administrative Database, 1982 to 2007.

Chart 7
Median replacement rates of adult-equivalent-adjusted family income after taxes, top quintile



Source: Longitudinal Administrative Database, 1982 to 2007.

4 Conclusion

In LaRochelle-Côté, Myles and Picot (2008a), the focus was on replacement rates for Canadian individuals who had a substantial attachment to the labour force—about 55% of Canadians. This paper extends the analysis to consider a larger group (some 80-85% of Canadians). Despite these changes, the results remain broadly similar. The AEA family income available during the retirement years to the "median" individual is about 80% of that observed when that same person was age 55. The replacement rate for individuals with a strong attachment to the labour force reported in the previous paper was 78%.[9]

As in the earlier study, the lower the income in the mid-fifties, the higher the replacement rates in the senior years. Individuals in the bottom quintile typically achieved a 110% replacement rate by their mid-60s, while individuals in the top income quintile had replacement rates in the 0.7 range. There was some variation within quintiles. For example, more than 20% of middle-income Canadians had replacement rates below 0.6 in their mid-70s.

9. It should be noted that these flows do not take into account the housing services that are produced by home ownership. Brown, Hou, and Lafrance (2010) report that the implicit rent that equity investments in homes generate provides an additional, and substantial, source of income to the average retiree.

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